Renewable Energy - Wind
February 2005

Overview

Brazil has a large and diversified economy that offers US companies many opportunities to export their goods and services. As Brazil's largest single trading partner, the US enjoys a strong reputation in a variety of sectors. This report is one of a series that is published by the US Commercial Service's team of sector experts throughout the year. If you do not see an opportunity for your product here, please check out our other reports at www.buyusa.gov/brazil and consider contacting us directly to find out if we can help you export to Brazil.

Market Overview

The Renewable Energy sector in Brazil has a very large potential for development in the next years, with many new projects expected for 2005 to 2008. The main reasons for this are: (1) Brazil has excellent natural resources for wind, biomass, solar and small-hydro projects, and (2) the federal government created the Incentive Program for Alternative Electric Energy Sources (PROINFA), that guarantees the installation of 3,300 MW from small alternative sources until December 2008. This program is expected to attract US$2.5 billion in investments during the next three years. Small projects are defined in PROINFA as having a maximum installed capacity of 30 MW.

PROINFA subsidies for renewable energy
PROINFA guarantees the purchase of 1,100 MW generated annually from each of three power sources: wind, biomass and small hydro. Under this plan the Brazilian federal government, through its holding company Eletrobras, has already selected in 2004 the projects that are eligible to sell energy to the national grid in 20-year contracts (PPA) with autonomous independent producers. These selected projects will receive up to 70% cheaper financing from the Federal Economic and Social Development Bank BNDES; and must have a minimum 30% financed by equity capital. A special fund of US$280 million called "Brasil Energia" was already set up by private pension funds and BNDES to offer financing to project sponsors selected under PROINFA. In order to qualify for the PROINFA financing, a minimum of 60% of the project procurement must be of Brazilian-made equipment.

After this goal of 3,300 MW is installed, a second phase of PROINFA will immediately follow, to ensure that in the end of 20 years wind, biomass and small hydropower systems supply 10% of the annual electric power consumption in Brazil. For this second phase, only projects with at least 90% of Brazilian-made components will be eligible for BNDES financing.

Light for All
The Brazilian federal government has another important project, called "Light For All" (Luz Para Todos) which set a goal to achieve universal access to safe and affordable energy, as one of the central components in its fight against rural poverty.

There are currently nearly 18 million Brazilians living in remote communities that do not have reliable access to electricity, being that almost 10 million of them do not use electricity in any form. In the Amazon region, with an extremely low population density of 3.7 hab/km2, there are more than 1000 mini power plants, mainly using diesel oil to supply electricity to isolated villages at a very high cost. Many of them are old and inefficient.

Brazil's Current Energy Mix

Brazil needs to increase its generation capacity by an additional 3,000 MW annually. Approximately 77% of the total electricity in Brazil is generated by hydroelectric power plants, and Brazil accounts for nearly 12% of the world's hydroelectric power supply. Power shortage and rationing of electricity in 2001 led to a top government priority of diversifying the energy matrix. The rationing ended in March 2002, but it was a landmark in the progress of renewable energy in the country.

About 46% of Brazil's energy matrix comes from renewable sources, especially hydroelectricity, biomass and ethanol, while this percentage tends to be between 6% and 15% in developed countries. 98% of the Brazilian electrical market is one vast interconnected system.

Energy Mix in Brazil (Feb 2004)

Type	Capacity	%
Hydro	74,225 MW	77.3 %
Gas:	7,295 MW	7.6 %
Petroleum:	5,842 MW	6.1 %
Nuclear	2,007 MW	2.1 %
Coal	1,461 MW	1.5 %
Biomass*	2,556 MW	2.7 %
Wind	24 MW	0.03 %
Imported	2,570 MW	2.7%

* 57% of Biomass is sugarcane.

Brazil's Total Energy Matrix 2004	
Type	**%**
Petroleum	43%
Sugar Cane	15%
Hydro	14%
Firewood and Charcoal	14%
Natural Gas	9%
Metallurgical Coal	1%
Uranium	1.8%
Other Renewable Sources	3%
Steam Coal	0%

Includes all forms of energy used in Brazil, not just generation.

The national reference centers CERPCH (small hydro), CRESESB (wind), GREENSOLAR (solar and wind) and CENBIO (biomass) promote the development of R.E. by disseminating information, supporting studies and projects, laboratories and working groups and establish a network between industries, schools, universities, utilities and government agencies. See their web addresses in pertinent reports.

Eletrobras/Centrais Elétricas Brasileiras S.A. is the federally owned state electricity company and was until recently the former vertical monopoly, for construction, generation, transmission and distribution of electricity. power utility. www.eletrobras.gov.br

CRESESB, hosted by CEPEL Electrical Energy Research Center of Eletrobras, www.cresesb.cepel.br, manages two working groups on solar and wind, whose membership includes universities, government, agencies, private companies, research centers and engineering companies. Its website has a long list of Brazilian suppliers of products and services, divided by sub-sector, with links to their respective websites. It has worked in cooperation with the USDOE for many years, including joint-projects with the NREL. It also works very closely together with the major Brazilian utilities.

ABEER The Brazilian Trade Association for Renewable Energy and Energy Efficiency, www.abeer.org.br . It sponsors a trade show on R.E. in Brazil, to be held on Oct. 13 and 14, 2005 in Rio de Janeiro: www.saagle.com.br .

ANEEL National Agency for Electrical Energy, www.aneel.gov.br, independent regulatory agency, with powers to grant concessions and authorizations for building and operating power plants, and for supplying electricity to the national grid, and charged with promoting and regulating competition in this sector.

APMPE Association of the Small and Medium-Sized Electric Power Producers, www.apmpe.com.br, interested primarily in small hydropower projects.

BNDES National Bank for Economic and Social Development www.bndes.gov.br, the only source of financing at rates below commercial banks, is an important tool of the federal government to incentive the development of R.E. in Brazil.

IDER Institute of Sustainable Development and Renewable Energy www.ider.org.br

RENOVE National Network of Organizations for Renewable Energy www.renove.org.br, network of 26 organizations working primarily in rural areas to support the commercialization of R.E., as well as research and education. It provides technical assistance, small demonstration projects, and promotion of development models that rely on public/private partnerships. Its members are NGOs and research institutions.

USAID The U.S. Agency for International Development, www.usaid.gov, supports R.E. demonstration projects and cooperation between U.S. and Brazilian firms and public institutions.

ABIMAQ The Brazilian Association of Machinery Manufacturers, www.abimaq.org.br. It has a large databank of Brazilian suppliers of all kinds of machinery, that can be accessed online.

Winrock International, a non-profit international NGO whose mission is to support projects that increase economic opportunity, sustain natural resources and protect the environment. It works on several projects in Brazil, for natural resources management and clean energy www.winrock.org.br.

ABCE Brazilian Association of Engineering Consultants, www.abce.org.br .

Agência Mandalla www.agenciamandalla.org.br, NGO supporting sustainable development projects, including alternative energy sources.

Best Prospects - Overview

Export opportunities to Brazil in Wind Power are for specific parts or services, but not for turn-key equipment. Since Brazil has a very diversified industry, and import duties and fees are high, Brazilian-made products are normally cheaper than similar imports. Examples of products and services that have best prospects to be imported are automation systems, remote operation control, internal combustion engines, gaseification equipment and logistical services to move wind power equipment.

Wind Power Prospects – Regional but Promising

In Brazil there are regions with good wind power potential, and most are naturally complementary with the rainy season. Atlases of the wind resources in Brazil are available to estimate the wind power potential for any region of the country. The most promising areas are the coastline and center of the North and Northeast, the north of the state of Roraima, and the South of the country especially the coast of the state of Rio Grande do Sul. Even the most conservative estimate puts the potential for power production from the wind at more than 70,000 MW, which is almost equal to Brazil's entire generating capacity.

Petrobras, the Brazilian oil producer, plans to have 60 MW of wind power plants in its portfolio by 2010, mostly for own consumption of its oil facilities. It also plans to partner with wind power project sponsors that had their projects recently selected by the Proinfa program, to provide about half of the 30% venture capital needed. Petrobras already has one wind power plant of 1.8 MW in operation, and is building two other pilot plants of 3 MW each.

The German company **Enercon GmbH** has a subsidiary in Brazil, called **Wobben Windpower**, which is the only manufacturer of large-scale wind-power systems in South America. It supplies turn-key plants with a high content of Brazilian-made components, and even exports from Brazil to other countries. Wobben also operates as an independent energy producer on five wind energy power plants in operation in Brazil, and one in Argentina (Patagon region). According to Wobben/Brasil, it has already sold equipment for the installation of 208 MW, of the 1,100 MW PROINFA first phase. One key advantage of having local manufacturing is to sell in Brazilian currency and avoid the exchange risk, in addition to eligibility for official financing.

Wobben installed in late 2003 the first wind power plant of a private investor in Brazil with 8 generators E-40/600 kW(in Santa Catarina state) and the first wind power plant of Petrobras (in Rio Grande do Norte state) and is currently installing a 9 MW plant for private investors in SC.

Wobben has been involved in the following projects:

- a plant for **COPEL** (Paraná) with 5 E-40 / 500 kW generators, in operation producing 5000 MWh annually.
- a plant in Taíba / Ceará started-up in 1999, IPP with 10 E-40 / 500 kW producing 17.5 million kWh / year.
- a plant in Aquiraz / Ceará with 20 generators E-40/500 kW, started up in 1999 producing 35 million kWh annually.

Most of its Brazilian equipment is of the E-40 / 600 kW series with total compatibility with the local utilities where they are connected. They have direct coupling rotor/generator (no transmission). Recently Wobben also started manufacturing the E-70 / 2000 kW series in Brazil.

GE Wind already outsources the production of rotor blades to **Tecsis** in the town of Sorocaba in São Paulo state and is considering investing in the company, to manufacture up to 70% of the turbines in Brazil. GE recently partnered with **Seawest** for two projects in Brazil - one contracted at 18 MW (with potential for more) and one for 20.05 MW.

Tacke Windtechnik supplied 4 generators 300 kW to the power utility **CHESF**, for a project located in Mucuripe.

Key Resources for Wind Power Prospects

- **CRESESB** Reference Center on Solar and Wind Energy, of Eletrobras, as previously mentioned, www.cresesb.cepel.br.
- **Federal University of Pernambuco** – UFPE, through its Brazilian Center for Wind Energy – **CBEE**, www.eolica.com.br working on research, engineering and consulting. It has cooperation agreements with several international organizations, including the **NREL** in the USA.
- **Federal University of Rio de Janeiro**, through its Alternative Energy Sources Laboratory LAFAE, www.solar.coppe.ufrj.br.
- **Celesc**, power utility of the state of Santa Catarina, has an installed capacity of 12.6 MW, www.celesc.com.br.
- **Acumuladores Moura**, manufacturer of special batteries for wind and solar energy, www.moura.com.br.
- **IDER**, an NGO based in Fortaleza, promotes renewable energy. IDER has implemented numerous wind projects and community-based solar home system initiatives. www.ider.org.br.
- For more information about export opportunities in this sector contact US Commercial Service Trade Specialist Mauricio Vasconcelos at: mauricio.vasconcelos@mail.doc.gov
- For a good overview of exporting to Brazil, please look at our US Country Commercial Guide to Brazil: www.focusbrazil.org.br/ccg
- For more reports on this sector in other countries, please visit Export.gov's site for Market Research Worldwide: http://www.export.gov/marketresearch.html